SAVONIA

Revenue Models of Mobile Health Applications

Free-to-play applications

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Bachelor's Thesis

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Bachelor's degree (UAS)

SAVONIA UNIVERSITY OF APPLIED SCIENCES **THESIS**
Abstract

Field of Study Social Sciences, Business and Administration			
Degree Programme Degree Programme in International Business			
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Title of Thesis Revenue Models of Mobile Health Applications: Free-to-play applications			
Date	19.3.2015	Pages/Appendices	40/0
Supervisor(s) Abdelazim Hannoura, Ulla Loikkanen			
Client Organisation/Partners Health ProPeli project, Miika Kajanus			

Abstract

The objective of this thesis was to establish whether the proven revenue models of core applications are appropriate in mobile health or "mHealth" applications, i.e. fitness and wellness and medical applications. This research focuses on the free-to-play and freemium revenue models. Another target was to elaborate on the mobile health environment and present its versatile utilization areas. The work was commissioned by Savonia University's Health ProPeli project which is part of the bigger Games for Health program. The project aims to study the use of gaming technologies, digital- and physical innovations and gamification in health care, functional capacity and rehabilitation.

The main research method was five qualitative standardized open-ended interviews. The interviewed professionals are from business and software development and theme park construction and design. In addition, a literature review was conducted to formulate the theoretical framework. The data from both primary and secondary research were then combined and analyzed to see whether the results achieve similar conclusions.

Both theory and research indicated that freemium with either in-app purchases or advertising can act as a viable mHealth application revenue model, for at least fitness and wellness applications. Further research is required to determine whether this is the case for medical applications, as well.

Keywords
freemium, free-to-play, mHealth, mHealth applications, mobile health, revenue models

CONTENTS

1 INTRODUCTION

Mobile health or ‘mHealth’ has the prospect to save both patients’ and doctors’ valuable time and money when used properly. Collins (2012) argues that the more patients are involved in their own treatment via self-monitoring, the more committed they will be to the program and hence achieve better results. In addition, possessing all this data facilitates evaluating consumption and behavioural patterns, thus enabling patients to manage their own health and wellbeing. Furthermore, this ‘big data’ is central in creating sustainable and accessible health record models. (Collins 2012.)

By enabling patients to self-track their daily health outside the clinical environment, they are empowered to lead a healthier and more conscious lifestyle. This not only enhances their wellbeing and health knowledge but can also prevent diseases altogether. Self-tracking daily consumption patterns, exercise routines and other daily activities enable patient autonomy. Likewise, it creates valuable data for health care professionals to use as support in the treatment of patients. (Collins 2012.)

This thesis work is dedicated to mobile health and more specifically to the revenue models of ‘free’ health applications. According to a study by PwC and GSMA[1], mobile health has the possibility to save up to 99€ billion in healthcare costs in the EU in 2017. The ageing population and the increased budgetary pressure are some of the challenges that the European healthcare system currently faces. In this context, mobile health could assist by contributing to a more patient-focused healthcare, and by supporting the shift towards prevention whilst improving the system’s efficiency. (European Commission 2014). Therefore, the writer considers the topic to be of great current importance for both study and business potentials.

The topic of the thesis was chosen as the author herself is interested in mobile health, and specifically in its potential to achieve great monetary savings for healthcare. The idea occurred during the author’s internship period as a project assistant in the project Health ProPeli. The internship was conducted during spring 2014 and autumn 2014. Later on the scope of the research was identified in collaboration with the author’s supervisor from the client organization.

[1] GSMA, Socio-economic impact of mHealth, June 2013

Background information of the client organization

Health ProPeli project is part of the bigger Games for Health program. The aim of Health ProPeli is to study the use of gaming technologies, digital- and physical innovations and gamification in health care, functional capacity and rehabilitation. These might help people become motivated for preventive healthcare, manage their own treatment and obtain better results in general. Furthermore, business opportunities based on the study's findings are pursued. In practice the program is implemented by combining health, product development and business knowledge in multidisciplinary teams consisting of students, teachers and multitalented professionals. (Gideon 2014.)

The main goal and objectives of the thesis

The primary goal is to answer whether the established revenue models of core 'free' applications are appropriate in health applications. This is attempted by analysing these afore mentioned application types with the help of a literature review and more importantly with interviews given by professionals. In this sense, the thesis can assist health app developers as well as other stakeholders in making a decision on the right revenue model for their app or investment.

Furthermore, the thesis unfolds the mobile health domain and presents the versatility of mobile health devices. The current paper concentrates exclusively on the revenue models of free applications (i.e., the free-to-play and freemium models) disregarding paid applications. This exclusion is made to keep the scope of the research manageable.

Thesis contents

This work contains the introduction, research methods explanation and four main chapters: starting from theoretical concepts and leading to the main research. The theoretical basis of the work presents the main concepts of mobile health, its utilization areas and the application revenue models (chapters 3, 4 and 5). Furthermore, in chapter three there are some issues to consider in health app development. Chapter six 'the Interview' is the main research part. It includes five professional interviews and the analysis of the results. Finally, conclusions are made and the success of the thesis and personal growth are discussed.

2 RESEARCH METHODS

Primary research

This work is implemented by means of a qualitative research method since its experience-based approach suits the general goals of the thesis best. The heart of this research are five interviews with specialists from relevant fields of business. The interviewees' experience and expertise on business models of mobile games and applications validates the research and provides credibility.

The selected interviewing technique is the standardized open-ended interview. Its structure and efficiency alongside the available resources played a significant role in the decision to use this exact technique. In the standardized open-ended interview the same questions are asked to all interviewees, however, the responses are open-ended making this a qualitative method. (Sewell 2010.) This approach helps the interviewer to analyze and compare the interviews (Valenzuela & Shrivastava 2002).

To ensure the reliability and validity of the interview process, the applied techniques must aim to be:

- Reproducible: someone else using the same topic guide can generate similar information
- Systematic: to ensure that one is not simply picking interviewees or data that supports their pre-existing ideas of the solution
- Credible: the questions and ways of asking them should be reasonable for generating valid accounts of phenomena
- Transparent: methods should be presented so that the readers can see exactly how the data were collected and analyzed.

  (Bricki & Green 2007.)

The research objectives determine the type and amount of people to select in a sample (Mack, Woodsong, MacQueen, Guest & Namey 2005). Since the purpose of the conducted interviews was to receive a professional opinion on health app revenue models rather than a generalizable viewpoint, the quality of the interviewees outweighed the importance of their quantity. Thus, five experts in their own field (business development, software development, and theme park construction and design) were interviewed between November 2014 and December 2014.

Three interviews were in written form, one was a telephone interview and one was a face-to-face interview conducted in Kuopio. To secure the anonymity of the respondents, their names are coded as “Interviewee1”, “Interviewee2”, “Interviewee3”, “Interviewee4” and “Interviewee5”. The subjects were referred to the writer by her contact from the client organization.

Subsequent to conducting the qualitative interviews the data is analyzed. Using thematic analysis the transcripts are firstly read and annotated: at this point preliminary observations are made. Secondly themes, i.e., summaries of ‘what is happening’ are identified. Finally, all of the themes are coded into groups. In addition, patterns across the data are studied and conclusions displayed. (Bricki & Green 2007.)

Secondary research

A considerable part of the thesis is based on secondary research. “Secondary data can include any data that are examined to answer a research question other than the question(s) for which the data were originally collected” (Vartanian 2011, 3). This data type creates the theoretical background of the thesis, produced by material from the Savonia University library and international electronic compilations. Other secondary sources such as online articles and distinguished blogs are also examined.

As the overall thesis topic is rather new to the general public, it is essential to first elaborate on the main concepts of mobile health to unfold the topic. Secondly, a few ways of how and where mobile health can be used are explained to achieve a deeper understanding of its versatility. To finalize the theory the revenue models of “normal” or core applications are deliberated, and examples of health application revenue models are presented.

The research process summary is displayed below in Figure 1. It shows the thesis process from the beginning of defining the research questions to the end of drawing conclusions and editing the final text.

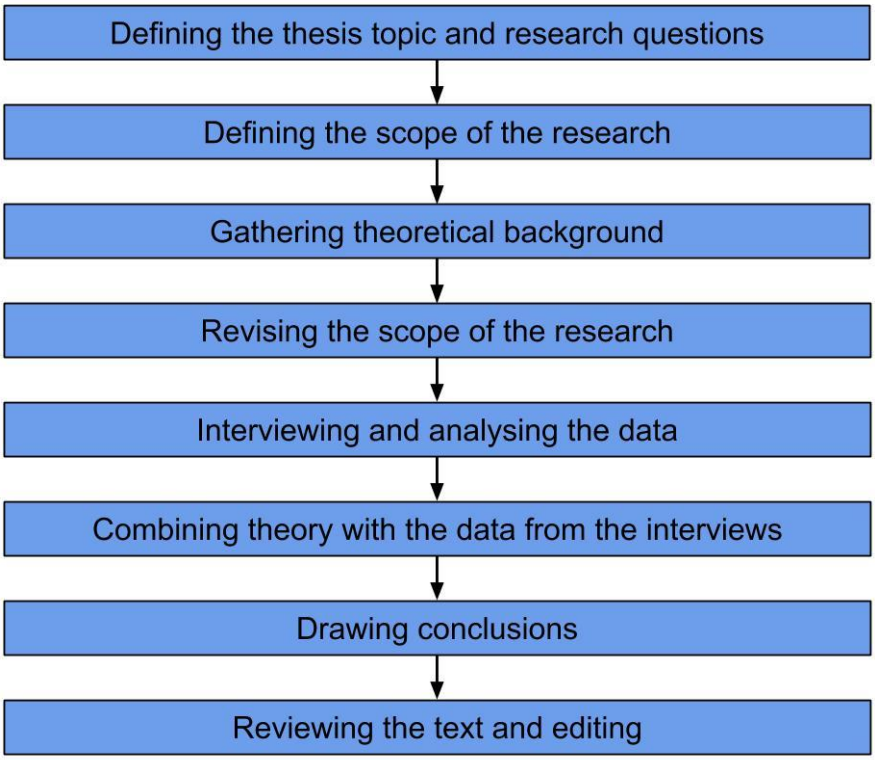

FIGURE 1. The research process model

3 MOBILE HEALTH

The World Health Organization (WHO) defines mHealth as “the spread of mobile technologies as well as advancements in their innovative application to address health priorities”. It adds that “mHealth is a component of eHealth.” (Healthcare Information and Management Systems Society 2012.) WHO additionally describes eHealth (or e-health) as “the transfer of health resources and health care by electronic means” (WHO 2014).

Furthermore, the American Telemedicine Association (ATA) (2012) defines mHealth as “a form of telemedicine using wireless devices and cell phone technologies. It is useful to think of mHealth as a tool - a medium - through which telemedicine can be practiced”. Telemedicine moreover is “the remote delivery of healthcare services and clinical information using telecommunications technology. This includes a wide array of clinical services using internet, wireless, satellite and telephone media.” (ATA 2012.)

For the purposes of this thesis, the definition by Shar (2012) is preferred. Shar (2012) states that “the true definition of mobile health does not focus exclusively on the device, but on the fact that the information and data is mobile”. He continues that “the information is able to be collected wherever, and transmitted wherever it needs to go”. Data received and transferred via mobile health devices is never stagnant nor out-dated, since data can be tracked and updated without interruption as a constant feed. Owning vast amounts of health data, however, is worthless to either doctors or patients unless they possess validated tools that translate this data into comprehensible health information which can be act upon when needed. (Shar 2012.)

3.1 Mobile health devices

Mobile health covers *“medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices”* (WHO 2011). *“*It also includes applications such as lifestyle and wellbeing apps that may connect to medical devices or sensors (e.g., bracelets or watches) as well as personal guidance systems, health information and medication reminders provided by SMS and telemedicine provided wirelessly” (European Commission 2014).

A magnitude of devices and applications that allow individuals to monitor various aspects of their health condition exist. This has enforced the quantified self-movement[2] which for now is about understanding one's activity level and basic bio signs, such as heart rate and blood pressure. Ultimately it can lead to individual empowerment. (Esquivel 2013.) According to Esquivel (2013) "spotting a dangerous biomarker before physical symptoms manifest could potentially lead to early detection of serious illnesses, and consequently early intervention". Subsequently, these lead to better outcomes which further reduce costs of health care (Esquivel 2013).

3.1.1 Mobile health applications

Mobile health applications are divided into fitness and wellness apps and medical apps. The following examples attempt to give a holistic picture of the diverse health apps currently on the market.

Examples of fitness and wellness applications

Nike's running application "Nike+ Running" helps runners keep track of their routes and progress. In-run audio feedback of metrics, such as pace and time, are used to motivate runners. Following each run a summary is displayed with details of the route. Furthermore, progress can be observed in a bar-graph historical view of completed runs. (European Directory of Health Apps 2012-2013.) This can be considered a wellness app since it promotes a healthy lifestyle, and can help prevent diseases such as obesity. Applications such as the Nike+ Running are usually sold directly to the end-consumers (business-to-customer, B2C) through digital distribution platforms of the core games industry. (Kaleva et al. 2013, 16.)

Centered is another wellness tracking application. It focuses on activity tracking and meditation and is intended for the members of the Health Care Service Corporation, an U.S. insurance company. Centered displays a daily summary of calories burned and miles walked as well as time spent being active every day. Additionally, it offers users meditation sessions ranging from four to 19 minutes. (MobiHealthNews 2014.)

[2] Refers to people tracking and recording their own health data with mobile health devices

Examples of medical applications

Opposed to wellness games, medical games are developed for rehabilitation purposes. In this sense gaming systems such as Xbox Kinect and Nintendo Wii can be considered medical games since they can assist in the rehabilitation of stroke patients, for instance. Using video games in physical therapy can turn out very effective because they provide an escape from mundane exercises, and increase repetitions. (Boehm 2013.)

However, games that can potentially be used as tools to help treat disabilities exist as well (Kaleva et al. 2013, 16). A research[3] conducted in Padua, Italy showed that 10 children with dyslexia who played an action-filled video game for a certain period, increased their reading speed without introducing mistakes. (Solis 2013.)

myVisionTrack™ is a hand-held, prescription-only medical device in the form of an app which allows patients to test their visual function (Duffy 2013). It is intended for patients with degenerative eye diseases to help them self-monitor their eye condition at home between check-ups. If any irregularities occur, the physician receives the notice to review the patients data and determines whether they should come in for a check-up sooner than scheduled; this insures that patients receive timely care and treatment. (Vital Art and Science Inc. 2014.)

Monster Manor and Mission T1D are both cost-free diabetes-related mobile games which encourage treatment adherence and better management of diabetes. In this sense they can be considered medical games. Both games are designed to help children, with type 1 diabetes, to better understand their condition and manage it. Monster Manor encourages players to regularly test and log their blood glucose levels, whereas Mission T1D is more about increasing the awareness of type 1 diabetes. (Tyer 2013.) Moreover, Mission T1D is also intended for the parents and caregivers of children with T1D. It can additionally be used in a classroom setting to help all children understand the condition. (Pickering 2014.)

Medical games must undergo a set of clinical tests to prove their health effects prior to being released to the markets (Kaleva et al. 2013, 16). The US Food and Drug Administration (FDA) (2014) defines mobile medical apps as “medical devices that are medical apps, meet the definition of a medical device and are an accessory to a

[3] Action video games make dyslexic children read better, March 2013

regulated medical device or transform a mobile platform into a regulated medical device".

At present, medical games are mainly intended for professional use only, though there are some early signs of B2C use as well. Lumosity Brain Trainer is one of the first successful examples in this field. (Kaleva et al. 2013, 16.) Lumosity is an online tool that allows users to exercise core cognitive abilities. It offers brain tests, training reminders and comparisons to other members using the tool. The ten brain games enhance cognitive abilities such as memory and attention span. (European Directory of Health Apps 2012-2013.)

3.1.2 Smart clothes

Smart clothes can be considered as any piece of garment with technology stored within. Coats and shirts monitor a user's vital signs and immediately report any situations that require acute attention. Furthermore, smart clothes may assist people with kinetic problems, coats can retain constant temperature under changing climatic conditions, and shirts can monitor physiological indicators of individuals with chronic diseases. Additionally, smart clothes may serve as preventive monitoring for people that have a perfect health condition. Finally, smart clothes observe athletes during a workout or competition and notify of upcoming dehydration. (HealthWear 2007.)

A concrete example of smart clothing is AiQ's BioMan: a shirt with integrated sensors that can track heart rate, respiration rate and skin temperature. The received data are then sent to a smartphone or other mobile device wirelessly via Bluetooth. The data are useful for weight control, sports training and health monitoring. (AiQ 2014.)

The ProeTEX smart garments, a project partly funded by the European Commission, represent another example of technology within clothing. ProeTEX includes portable sensors and devices that continuously monitor the risks endangering the lives of emergency disaster personnel. The system allows detection of a wearer's vital signs (e.g., heart rate and breathing rate) and environmental parameters (e.g., presence of toxic gases) to process data and remotely transmit useful data to the operations manager. (Chan, Estève, Fourniols, Escriba & Campo 2012.)

3.1.3 Wearable devices and sensors

Google Glass is an example of a wearable mobile health device. It offers endless user possibilities ranging from tracking your daily routines to sending a SMS to your physician – everything at the reach of your hands, or eyes. All of the Google Glass features may be accessed by voice. Google Glass has recently been utilised at Stanford University's Medical Center to train its residents in performing a surgery. Another pilot study from Stanford University shows that Google Glass can help surgeons monitor the vital signs of patients more closely during surgery. (MobiHealthNews 2014.)

Beddit Sleep Monitor is a thin and unobtrusive sensor placed under the bed sheet. It monitors a user's heart rate, breathing rate and movement during sleep. All of the data are then sent via Bluetooth to the person's smartphone (requires also the Beddit app). Once the user wakes up, they will receive a sleep analysis and tips on how to enhance the quality of their sleep. (Mobiili 2014.)

3.2 Considerations for mobile health app developers by Sitra and Neogames

Hiltunen from Neogames[4] (2013) emphasizes that app developers should pay attention to the sustainability of health app business models. For wellbeing games the business models are more easily developed based on the business models of the core game industry, whereas for medical games a game-as-a-service approach is necessary (Kaleva et al. 2013, 16). Rapid prototyping in game designing is also required to see whether the target group finds the game interesting. (Arpola & Vehkala 2014.)

Sitra, the Finnish Innovation Fund, in their report[5] says that health games need to be developed to be primarily entertaining and health effects should be seen as additional elements of the gameplay; however, this is not the case for medical games. Therefore, game-like elements, such as motivation and rewarding, should be considered and designed within the health game early on the development process. (Kaleva, Hiltunen & Latva 2013, 15.) Likewise, health games need to be straightforward whether they are targeting end-customers directly (business-to-consumer, B2C) or intended for those third parties (business-to-business, B2B) providing healthcare services to end-consumers (Kaleva et al. 2013, 13).

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[4] The hub of the Finnish game industry
[5] Mapping the full potential of the emerging health game markets, September 2013, Sitra and Neogames

Even though health games should be as entertaining as possible, the technological aspects of gaming platforms may cause some limitations to this. In addition, the health goals of the game may limit game mechanics. Attention should be paid on choosing the appropriate technological platform, so that the desired health goals become accomplishable and the target group accessible. In addition, benchmarking existing software licensing models that allow licensing the product for both private and commercial use is essential. (Kaleva et al. 2013, 6.)

Game developers should also outline the existing distribution channels and distributors, and cooperate with them. Alternatively, the developers themselves can become publishers or distribution platforms for health games. Proper relationships should be formed and maintained with all of the involved stakeholders. Furthermore, health game developers must respect the security and privacy of health information and consider the regulatory obstacles of owning health data. (Kaleva et al. 2013, 6.)

Health game developers can face challenges in commercializing their ideas. Games for Health Finland contributes in commercializing applications, building new business and rapid user testing. ”Games for Health is one opportunity for Finnish companies to become the new Facebook or Google”. (Arpola & Holopainen 2014.)

4 CORE APPLICATION REVENUE MODELS

4.1 Free-to-play games

The free-to-play (F2P) games are free to download and use. However, F2P contains "voluntary" in-app purchases (IAPs). Voluntary in the sense that IAPs are not a prerequisite for completing the game: they are simply additional features, such as virtual pets which are enjoyable but do not help the user complete the game. (Lovell & Fahey 2012, 13.)

Free-to-play games hold the potential to reach the widest possible audience since barriers to entry [price] are minimized. Nevertheless, they need to constantly acquire new users because only a minority become paying customers. Additionally, F2P games require a solid core gameplay, i.e., reasons why people keep playing the game: they must include incentives to keep users motivated and become paying customers. Moreover, the F2P business model has three important steps: acquisition, retention and monetization. These three steps equal the Funnel which is presented below. (Lovell & Fahey 2012, 15.)

The Funnel

Figure 2 demonstrates the Funnel, originally designed by Nicholas Lovell (2013). The Funnel provides three key steps in a financially sustainable free-to-play business model. Starting from acquisition and proceeding to monetization, the Funnel illustrates how the amount of players decreases in each phase. (Lovell 2013.)

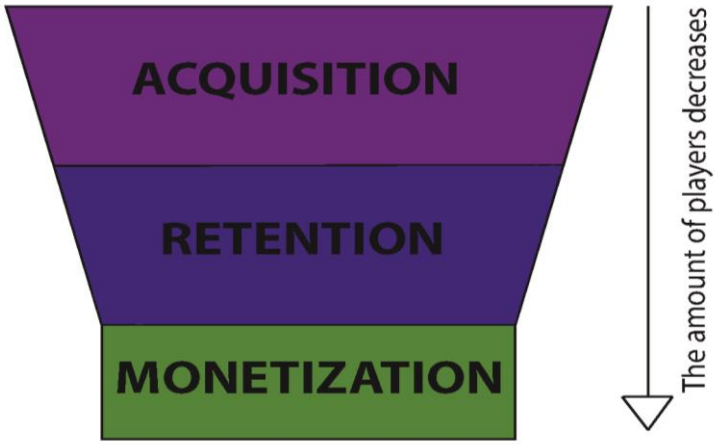

FIGURE 2. The Funnel. Adapted from Nicholas Lovell (2013)

1) Acquisition

Acquiring new customers through paid installs, organic installs (word-of-mouth and chart position), PR and advertising. Cross promotion may also be used: promoting the new game inside your old games or those of other studios to persuade existing players to download the new one. Acquisition regards motivating players to test your game for the first time. It must stand out from the abundance of other free games. To accomplish this, special attention has to be paid on marketing your product in the right forums. If the product is good, positive word-of-mouth will help boost the game's chart position and hence expose it to increasing downloads. (Lovell 2013.)

2) Retention

Retention is simply a figure showing how many players return to your game after the initial use. Since companies use a significant amount of money to firstly acquire new customers, the game should provide solid reasons to keep customers coming back. If retention is poor, money spent on acquisition will be wasted. (Lovell 2013.)

3) Monetization

The final step of the funnel is the only one that can create revenue. Since only a minority of users become paying customers, it is crucial to constantly acquire new ones and retain them. Monetization involves persuading players to pay for additional features. These features should generate real value to encourage customers to spend money on them. A F2P game should, however, not be created to solely generate countless revenue, but to ultimately be fun. If the monetization of the game interferes with the core gameplay and rather irritates players than engages them, the game is set for failure. Furthermore, the additional [paid] features must not create a disadvantage to non-paying players: in-app micro transactions should at all times be optional in F2P and they must not be a prerequisite for completing the game. (Lovell 2013.)

A mobile game utilizing free-to-play is Clash of Clans by Supercell. It is a combat strategy game that generates revenue from in-app purchases (Google Play 2014). Clash of Clans was the most revenue generating app of 2013, making Supercell the top grossing publisher of 2013 in the Apple App Store (Schoger 2013).

4.2 Freemium

The Cambridge Dictionary defines freemium as “a way of encouraging sales by offering basic goods or services for free while charging for more advanced products and services” (Cambridge University Press 2014).

In the freemium model, the (basic) application is free for users to download and use for as long as they like. Freemium app developers typically donate a free (basic) version of their app to generate buzz marketing, i.e., let the app advertise itself through positive word-of-mouth. Eventually a part of the satisfied non-paying users will want to upgrade to a better version of the app or make in-app purchases, and hence become paying customers. (Ellis 2013.)

Additionally, Anderson (2009) in his book “Free: The Future of a Radical Price” points out various models of freemium. He says that freemium can contain varying contents levels: from free to expensive or full price, to a pro version of some website or software, where there are more attributes than in the free version. Let us consider here the example of Flickr, the photo sharing app: the free version allows users e.g., to upload a limited amount of photos, whereas the paid pro version offers unlimited uploading capacity. (Pietiläinen 2009, 37.)

The revenue generation of freemium

In order to generate revenue from freemium apps, the three following attributes need to be fulfilled: 1) in digital products there is a 5% rule, where 5% of the users are paying and supporting the rest of the 95%. This works because the additional costs for the 95% of the users are close to zero. (Pietiläinen 2009, 38.) Therefore, freemium-products should acquire as many customers as possible; 2) the original (free) offering has to be solid to create a positive buzz, and moreover the paid version has to create added value for customers to induce them to upgrade; and 3) the freemium product should continue to add value as the user uses it over time. (Ellis 2013.)

Below are explained four methods freemium game developers can decide among to generate revenue from their game:

1) Advertising

Some ads are built in-game, but as games are increasingly created to be played on Internet-servers, ads can be constantly updated and changed to better suit the separate phases of the game (Pietiläinen 2009, 159.) This is also called dynamic in-game advertising (RapidFire 2014). Having the possibility to customize ads, according to the needs and wants of gamers, increases their relevancy and can offer real value to users. Another important factor to monetize with ads is to include choice: users are more likely to interact with an ad if they are provided options of brands and ads to engage with. This also makes ad space more valuable and attractive to brand partners. (Wadsworth 2013.)

2) Affiliate Marketing

This method provides a player with hard currency if they visit or register on a partner's (affiliate's) site (Luban 2012). Thus, instead of ads, players are presented with related links. Shopping app Wanelo displays products on sale, each of which is shared by a member of the Wanelo community. Users can follow their favorite stores or individuals and discover products they love. As these discoveries transform into purchases, Wanelo receives referral revenue. (Roup 2013.) *Angry Birds free* by Rovio Entertainment also employs affiliate marketing to promote its paid versions of the game (Google Play 2014).

3) Item-Purchasing

This form of a free app or game contains in-app purchases, i.e., purchases of virtual items and/or improvements such as level-ups. This money can be acquired by succeeding in the game (soft currency) or purchasing with real money (hard currency). (StartCapps 2010.) Having two separate "currencies" provides the game publisher control over the monetization of the game. If items could be bought by simply playing, players could finish the game without spending a dime. Furthermore, hard currency items contain a special value since they can only be acquired with real money. (Luban 2012.)

In Maple Story, a massively multiplayer online role-playing game (MMORPG), players can play the game for free. However, if they want to complete tasks faster

they must use either soft or hard currency. Maple Story also allows players to purchase items such as new outfits. (Pietiläinen 2009, 156.)

4) Restricted Access

The game can be downloaded for free, but the player does not have access to the whole game. Dofus by Ankama is a game that employs this technique: the player can e.g., build their avatar and initiate quests, but to enter all of the dungeons access to the entire game must be purchased. (Luban 2012.) A similar model is subscription: the "shell" of the app is free but subscription (a fee) is required to access the contents. An example of this is Orbyt: a virtual kiosk with digital newspapers that users can subscribe to. (StartCapps 2010.)

5 REVENUE MODELS IN MOBILE HEALTH APPLICATIONS

5.1 "Free" mobile health applications

Kaleva et al. (2013, 25) state that freemium could work for health (wellness) games targeting a "clear major segment of the mass markets". Additionally the freemium payment model can be seen "emerging among mHealth apps that provide fitness, wellness, and chronic disease management services as well as other healthcare-related information and tools" (Wasden & Weirz 2012). For medical games though, freemium is not an ideal approach due to the sensitive nature of health information. Therefore, consumers should at all times have control over their personal health data and be able to influence what data is shared (e.g., on Facebook or other social media). (Kaleva et al. 2013, 25.)

Advertising in mobile health games could be possible according to Kaleva et al. (2013, 16), however the health game would have to be able to reach the masses. Therefore, the game should be designed to impact a disease, disability, or other universal enough to concern the majority of people. Kaleva et al. (2013, 26) argue that targeting a niche group would only be sensible, if a health game is attempting to acquire research project funding for a specifically defined health issue. However, focusing on a niche would most likely not attract other potential investing actors for the game. On the contrary, from an advertiser's point-of-view a distinctive audience with detailed consuming patterns (shaped e.g., by diabetes), could offer a profitable channel for advertising. (Kaleva et al. 2013, 26.)

5.1.1 Examples of "free" applications with in-app purchases

Health and fitness applications: freemium model

Yoga Retreat, by the Finnish Gajatri Studios, is the world's first yoga-themed mobile simulation game. In the game, the user is a yoga instructor who teaches yoga poses and meditation to their customers. The goal is to develop one's own yoga retreat to the fullest. The player can advance in the game by simply playing or alternatively by purchasing items with real money to unlock them quicker. (Gajatri Studios 2014.)

The *Lose It!*-app supports users with healthy and sustainable weight loss. It can be connected with activity trackers, wireless scales and other health and fitness applications such as Nike+ Running. These connectible devices as well as a bar code scanner facilitate health data tracking. The basic *Lose It!* is free, however, to use the app a user profile needs to be created. To access all of the premium features consumers pay $39.99[6] per year. (Lose It! 2014.)

Medical applications

The Lumosity Mobile app is free to download, and a few exercises can be completed free of charge. To access the entire content the user must pay a subscription fee ranging from $11.99 (monthly) to $79.99 (yearly)[7]. It offers memory and attention training in a fun way (see more on Lumosity in subchapter 2.1.1). Lumosity can additionally be played online on the company's website. Basic membership is free, and unsubscribed members have access to a limited amount of games and features. To unlock all of the content, users must create an account and pay a subscription fee as stated above. (Lumosity 2014.)

Epocrates is a medical app for health professionals. It enables more effective patient care by delivering physicians the right information immediately when requested. (App Annie 2014a.) The app features include information on drug prescribing, pill identifying, and far more. Epocrates offers three versions of the product: 1) the free Epocrates RX that excludes some of the features; 2) Epocrates Essentials that offers access to premium content and costs $159.99[8] per year; and 3) Epocrates for Institutions designed for e.g., hospitals and universities, including all of the premium features. Prices need to be requested for and they are tailored to suit the individual needs of each customer. (Epocrates 2014.)

5.1.2 Examples of "free" applications without in-app purchases

Health and fitness applications

mHealth apps such as *iTriage – Health, Doctor, Symptoms, and Healthcare search*, and *ZocDoc – Doctor Appointments Online!* employ a payment model where hospitals and

[6] The price is quoted from http://www.loseit.com/premium/
[7] The prices are quoted from https://itunes.apple.com/us/app/lumosity-mobile/id577232024?mt=8
[8] The price is quoted from http://www.epocrates.com/products/features

physicians pay for the service so that consumers can use them free of charge (Wasden & Weirz 2012). iTriage, for instance, charges these providers for premium listings and listings of waiting times [to their receptions] (iTriage 2014). ZocDoc on the other hand offers its providers (who pay a subscription fee) help to fill their last-minute appointment cancellations (ZocDoc 2014). These two apps offer users a search engine, from where they can easily locate healthcare providers and schedule physical or digital services (e.g., appointments). This model has already been used in music search engine apps, such as Shazam and SoundHound. (Wasden & Weirz 2012.) iTriage additionally offers users access to an immense healthcare and medical database, where it is possible to research symptoms and find the most appropriate medical facilities (iTriage 2014).

Fitbit is another health and fitness app which is free in the sense that it does not include IAPs. It is the "top app" for tracking all-day activity, workouts and health. Fitbit may either be used on its own to track basic activity and runs, or connected with Fitbit activity trackers and the Aria Smart scale, to achieve a complete picture of one's daily statistics. (Fitbit 2014b.) The activity trackers and the Aria Smart scale need to be purchased: retailing prices[9] range from £49.99 to £99.99 depending on the product (Fitbit 2014a).

The WebMD apps offer consumers physician-reviewed health content and interactive tools, such as a symptom checker, in addition to on-demand healthy living information (App Annie 2014b). The apps are free for consumers to download and use. Revenue is generated from partnering companies that advertise their own products through the WebMD apps. Some new consumer-based health applications are implementing this model for several reasons: first, users can provide inexpensive consumer feedback by rating the product; second, investors understand the value of the model; and finally, if the app is simple and the customer base is targeted and growing, advertisers will most likely want to pay to appear on the site. (Goldman & Duffy 2013.)

Medical applications

The Amwell: Live Doctor Visit Now app, as the name suggests, offers users the possibility to see a doctor anytime (24/7/365) and anywhere, without having to arrange an appointment beforehand. The app is free to download but requires users to create an account. During the visit the doctor can treat, diagnose and even prescribe for a variety of conditions. (Anderson 2014.) The cost of a visit is $49[10] for a 10-minute consultation

[9] The prices are quoted from https://www.fitbit.com/uk/store
[10] The price is quoted from http://americanwell.com/FAQs-online-doctor-visits.html

(American Well 2014). In other words, utilizing the app is free but consumers must pay for the appointment as they would when visiting the doctor's (physical) office.

6 THE INTERVIEW

The current chapter represents the practical research part of the thesis. The standardised open-ended method was used to conduct five interviews over a two-week period from the end of November to the beginning of December. However, one of these interviews allowed a more discussion-based interviewing technique since it was conducted face-to-face. Therefore, this interview generated more data compared to the 'by-the-script' interviews. The respondents are from Kuopio and Joensuu areas. Their main business expertise resides in software development, business development, and theme park construction and design. Table 1 presents the interview process with the help of a timeline.

TABLE 1. The interview process

5.11.2014	Contacting interviewees for the first time by email
17.11.2014	Sending a reminder via email
20.11.2014	Interview with "Interviewee1", written
25.11.2014	Interview with "Interviewee2", written
3.12.2014	Telephone interview with "Interviewee3"
5.12.2014	Face-to-face interview in Kuopio with "Interviewee4"
5.12.2014	Interview with "Interviewee5", written
8.-15.12.2014	Analysing the results
15.-18.12.2014	Drawing conclusions

As shown in Table 1, the interview process ignited the 5th of November by contacting the interviewee candidates via email. The initial correspondence included a cover letter and the interview questions. The questions were sent in advance to allow the interviewees to become acquainted with them. The cover letter contained a description of the writer and the thesis; the purpose of contacting as well as the purpose of the interview; where the contact information had been retrieved [from the client organization]; a notice of confidentiality; and finally a request for response to partake in the interview. Additionally, the interviewee candidates were offered four ways of organizing the interview: face-to-face, Skype, phone, or in writing. The various options allowed each person to decide the

most flexible and comfortable solution for their schedule. Once sending a reminder on the 17th of November, five positive responses were received.

The first two interviews conducted on November 20th and November 25th were both in written form. Furthermore, the interview of December 3rd was organized via telephone. Lastly a face-to-face interview was held on December 5th and another one in written form on the same day. Before starting each interview the respondents were reminded of the anonymity of the responses as well as of the objectives and purpose of the interview. Each respondent was also encouraged to present any questions they might have regarding the interview or its questions prior to starting.

The interviews included 12 questions categorized into three groups. The purpose of the interviews was to gain professional opinions on the following topics:

- current business models and revenue models for health applications
    - freemium-model:
    - in-app purchases
    - advertising
- challenges in designing a health application
    - sensitivity of health data
    - other challenges
- the future of health applications
    - revenue models of the future
    - future trends in health applications
    - the payers of health applications.

Once conducting the interviews the data is analysed. Using thematic analysis of qualitative data the responses are firstly read through and annotated to achieve an overall idea of the transcripts. Then themes are identified and coded into related groups. In this work, overall 15 codes were assigned to the themes and they were arranged by topic and subtopic. Finally patterns across the data are pursued and conclusions reported accordingly. (Bricki & Green 2007.) During this final stage the research was united with the theory to see whether the interviews generated similar information as the literature review.

6.1 The results

The overall findings of the interviews concur with the theoretical viewpoints. Many similarities arose in the succeeding subjects: the developer's responsibility in securing the privacy of personal health data; the proper applicability of freemium in wellness and health apps; and the argument on who should pay for health apps. Major differences did not manifest. The results are discussed in more detail in the next paragraphs. The appearance of the results follow the order of the interview questions: starting from the present moment, moving on to challenges of developing health applications and resulting in a speculation of the future.

Current business models and revenue models for health applications

Business and revenue models

All of the respondents agree that health and fitness apps should be designed to be primarily entertaining for the user. That said, the health aspects should be additional elements of gameplay. This is in accordance with the theoretical findings. However, this is not the case for medical apps as Kaleva et al. (2013, 15) argue. The interviews neither confirmed nor contradicted the later outlook.

Additionally, both theory and research emphasize that health and fitness apps must be user-friendly in their operability. Furthermore, two respondents mention that the price of wellness apps should be reasonable, and that the distribution models should be clear, indicating that the apps should be easily locatable by the customer.

Kaleva et al. (2013, 6) highlight that licensing health apps for private and commercial use is fundamental. One of the interviewed companies discussed the licensing model as follows:

> *"We have been working with our customer to build a basic cloud service, where healthcare providers license the cloud for themselves and then offer their services to their own clients"* (Interviewee4).

In addition, Interviewee 4 mentioned that choosing the right revenue model for a mobile health app depends on the scalability of the app:

> *"Are we talking about a single app that does something 'playful' where the financing can exclusively come from advertising, or is it a 'real health app' what might include a 100 000€ machine with what the app is used through. If we are talking about mobile and motivation-based apps, freemium where you pay a little and where you can buy additional features, is probably most effective. Whereas, when you have a disability that requires rehabilitation clients can be willing to pay in bigger scale."* (Interviewee4.)

Freemium, including in-app purchases and advertising

Theory suggests that freemium could be a viable revenue model for wellness games, especially those targeting a "clear major segment of the mass markets" (Kaleva et al. 2013, 25). The analysis of the interviews embraces the same viewpoint: all of the respondents agreed that freemium can work in wellness apps. However, research does not indicate whether freemium might function in medical apps as well.

> *"Freemium absolutely works. In fact, the Finnish healthcare system is working in this sense: a) The basic public healthcare is 'free'; b) the basic public healthcare is 'free' and one can pay for additional services; and c) the basic service is 'free' but it contains advertising: the medicinal industry is already using this."* (Interviewee1.)

Moreover freemium wellness apps containing in-app purchases received acceptance from all respondents apart from one:

> *"Users can easily decline from buying [micro transactions] if they cannot test them before purchasing. They are not able to see the additional value these could bring to them."* (Interviewee5.)

> *"I cannot see why in-app purchases could not work in health apps as well. However, the app developers must be reasonable with these micro transactions. This is a factor that will be scrutinized in the EU in the near future; it can bring along new perspectives / limitations / opportunities."* (Interviewee1.)

> *"In-app purchases work if the app is developed to support them"* (Interviewee2).

> *"Can certainly work just as in entertainment apps. Though, the free app has to be sufficient to retain customers and motivate them to pay for additional features. One idea is to have a comparison group data to which the user could compare their own progress to – or something similar that users would definitely be willing to pay for."* (Interviewee4.)

Theory sees advertising in mobile health games possible. Although, it adds that the game should be able to reach the masses, implying that the issue should be universal enough to concern the majority. (Kaleva et al. 2013, 16.) On one hand research accepts advertising as a possible source of revenue. On the other hand regards it with caution and criticism. One of the respondents was personally irritated by advertising and others typically referred to it with "can work, however…". All respondents agree that advertising has to be contextual to cause the least irritation in users.

> *"Personally it irritates, however, I understand that this [advertising] is the way the world works. In freemium revenue can be collected by advertising as well as by making it possible for the users to dismiss ads. When talking about wellness apps, advertising is a great way to sell by-products and added value services."* (Interviewee4.)

> *"I do not see any reason why advertising could not work in health apps as well. A polite policy, nevertheless is to allow users to buy an ad-free version. Furthermore, advertisers need to remember that it is not allowed to present health statements without clinical proof."* (Interviewee1.)

> *"Advertising is allowed as long as it does not disturb the user or the app usability. The functionality and unobtrusiveness of the ads must be tested beforehand and developed further. Consider here the example of Facebook: they have over time corrected the functionality of their ads based on customer feedback."* (Interviewee5.)

Challenges in health application development

Sensitivity of health data

Health game developers must at all times respect the security and privacy of health information and take into consideration the regulatory obstacles of owning health data (Kaleva et al. 2013, 6). This view is consistent with the findings of the research. The majority of respondents emphasize the importance of privacy protection in health applications. Also, users should possess the power to decide what data are collected from them and to whom they are shared. It is equally important to always ask the user's permission when privacy or security matters are concerned. Additionally, one respondent was concerned about how long the health data is stored within the system.

> *"Where is the line between a wellness app and a medical app? What data is even sensible to collect? Age group, gender and physical activeness can be asked to obtain 'comparison data' to what users can then compare their own data to. Nevertheless, the further we move towards medical apps the more constraints rise. Furthermore, the more our normal healthcare system is involved, the harder it becomes because of all the encryption requirements and medical records laws."* (Interviewee4.)

> *"The protection of privacy concerns all applications and services equally. In the end, the user decides what information they allow to be collected. In addition, there are many laws and regulations when it comes to medical records and their storing. For instance, if an entrepreneur in Finland performs a service which is described by the Finnish law, the generated patient information needs to be filed and conserved appropriately and be connected to the national health archives Kanta."* (Interviewee1.)

Other challenges

Attention should be paid on choosing the appropriate technological platform, so that the desired health goals can be accomplished and the target group reached (Kaleva et al. 2013, 6). One of the respondents stated that even though mobile games can be used anywhere, they can be accessed anywhere, the technology is rather inexpensive, and it is fairly simple to create an app in the mobile environment, it might not always be the right platform for a health game.

> *"The further we proceed towards professional healthcare, the question of whether the collected data has any real significance or whether it can be linked to the patient's everyday life (e.g., to rehabilitation and coping through life) amplifies. For some patients mobile is not an appropriate tool due to a disability and/or medical condition. In this case, mobility is merely a channel to transport data and the 'gameplay' is implemented with the help of sensors in clothes, or machines."* (Interviewee4.)

Three out of five respondents identified proving the application's health effects as the biggest challenge. Two also said that the closer we move towards medical applications and true health effects, the more healthcare professionals and experts need to be involved in the development process.

> *"Are the application's health statements justified? Can the applications keep their promises to the users?"* (Interviewee3.)

> *"When we move from fitness to the more serious side, clinical tests, research and expert analysis are required. But what about proving the health effects of wellness apps? How can these apps achieve a 'certification' that they truly have an effect? The regulation of the medical side is overly complicated, and then again the wellness side needs justification of its effects, to seize the attention of healthcare workers."* (Interviewee4.)

Two of the interviewees criticized the absence of a common forum where all of the health data from the health apps would be inserted.

> *"There is great challenge in how to obtain the data from single health apps to function as part of an individual's holistic health enhancement and regime"* (Interviewee1).

> *"The problem is that there does not exist any common forum: everyone creates their own game which is then played for a while and some data might be left somewhere. Anyway it is a detached solution: your therapist does not receive any notice of a) whether you have played the game; b) if you played, then how you played it; and c) no one knows how to utilize the data. Then the user plays another game and the same occurs yet again.*

> *There is no correlation linking these games. We are currently missing a 'sink' where all of the data would pool into and from where connections could be drawn and conclusions made. There is still a long way to go before any real tools that can be used in public healthcare surface. This is the biggest bottleneck: the data received from these games do not help the treatment process beyond one person."* (Interviewee4.)

Interviewee 1 furthermore brought up challenges in health app regulation and the complicated 'money flow models' of healthcare.

> *"The biggest challenges in healthcare are the rather complex 'money flow models'. For instance, in Finland around 80% of healthcare is publicly produced. The public service providers are guided by strict tendering acts in the EU that do not necessarily facilitate the deployment of new health apps. In addition, health apps are regulated by the healthcare devices and appliances law as well as by the EU's Medical Devices Directive. These inevitably pose restraints on flexible development procedures and rapid development cycles."* (Interviewee1.)

The future of health applications

Revenue models

For wellbeing games the business models can be more easily developed based on the business models of the core game industry, whereas for medical games a game-as-a-service approach is necessary (Kaleva et al. 2013, 16). One of the respondents reasoned the same regarding revenue models:

> *"The same revenue models that are already widely used in the core applications will become more popular in health applications as well"* (Interviewee1).

Papadopoulos, Sheth & Wurst (2013) argue that "there is no proven model for reimbursement of mobile health apps". One solution, however, is to follow the current core apps model and require that users pay for the apps themselves through the app stores. They continue that another approach is to partner with an existing therapy, and thus receive direct payment from the partner. Furthermore, they provide an example of

myVisionTrack that has cooperated with a large pharmaceutical company: the partner provides the app to users free of charge and reimburses myVisionTrack directly. (Papadopoulos, Sheth & Wurst 2013.)

Three of the interviewed discussed some plausible new revenue models as follows:

> *"I would broaden the concept of a health app at this point. A remote rehabilitation project, where a 'health app' can be considered to be many entities, has commenced in Kuopio through the Games for Health- project. Here these health apps are therapeutic tools, games and a cloud service where everything is connected. With the help of these services, a patient can practice while visiting their therapist, and then continue practicing at home. These can also be considered health apps." --- "So we are not making a health game that can be bought from the App Store, but a basic cloud service that healthcare providers can license, and then offer their services to their clients through the cloud. Our revenue model is thus a bit different."* (Interviewee4.)

> *"I am 100% sure that new revenue models can emerge. New models have developed already in the past few years, and we are still at the beginning of the development process. We will be involved in projects that are more on the entertainment side of health apps. We are interested to work with systems and software that can be adapted to serve various target groups from children to rehabilitation purposes."* (Interviewee3.)

> *"There is always room for something new. One model could be that individuals are provided with a 'personal health budget' that they can use for the services they wish. Additionally, using services from other countries brings new possibilities."* (Interviewee1.)

Trends in health applications

Two of the respondents did not speculate on future health application trends. The other three underlined trends such as 'adventurous health apps', integration to clothes and virtual reality.

"Adventurism. Wellness apps cannot solely be health-based but adventure- and experience-based. In many ways these will be more easily profitable because they can be used in multiple contexts." (Interviewee3.)

"Integration to clothes as technology becomes cheaper and as the line between the real and the virtual world is blurred through e.g., Google Glass. Also, education and knowledge improvement combined with physical activity and rehabilitation: where your exercise route consists of points where your understanding grows as you make healthy choices – this way learning and exercise become interactive." (Interviewee4.)

The payers of the future

Two of the respondents stated that the individual or user is the payer of health apps one way or another. Furthermore two respondents mentioned more than one payer. One of the interviewed did not comment on the matter.

"The individual pays" (Interviewee2).

"The user pays one way or another: through taxation; insurance payments; direct sales; with their own labor; and so on. Of course there are also so called 'free' products that are enabled via advertising. In addition, parties or players of some sort can be born that specialize in collecting and producing data for others. These parties can then offer all kinds of health apps for 'free' use, if they receive the exclusive access rights to the data and the ability to share it onwards (anonymously or not)." (Interviewee1.)

"There is not only one payer. Surely there will be services and products for each target group individually, so whomever benefits most from them pays: consumers pay for entertainment-based apps; healthcare centers, hospitals and insurance companies pay if the service can help them reduce costs; and so on. Payers of health apps can be located based on what is being offered." (Interviewee3.)

"Easy to find at least 4-5 payers: 1) the user or patient; 2) the private sector offering the service, e.g., rehabilitation, personal trainer, a gym, and so on; 3) the private or public healthcare sector that link this service to their

treatment program; 4) insurance companies that have their own interest in rehabilitating people quickly back to working life; and 5) around all of this develop players like us that offer a cloud service where one can run their services, and market and administer them to their target groups." (Interviewee4.)

Additional results from Interview 4

Since Interview 4 was conducted face-to-face, it allowed more flexibility in the interviewing situation. The same standardised open-ended method was used here as well, but follow-up questions and a discussion after the main questions separates this interview from the others. The additional information received from Interview 4 is very relevant to this thesis topic, and is therefore discussed in the results as well.

First a scheme for a new national health data archive as well as its significance are discussed. Then the cloud service that the company is providing to their customer is elaborated on.

"A national health data archive should be developed. All computer games, mobile games and the like would produce data to this database. Data containing categories, such as gender and age group, would then start to accumulate there, and a comparison data could be formed: people could compare their own recovery or progress to this comparison group. This should be our mutual interest: no one can implement this on their own. Multitalented and multidisciplinary cooperation is needed." --- "This data would provide a great deal to health game developers as well. A model that allows one to compare data and proportion the results of players to other players, however, is not possible unless you are a gaming house like Rovio that has sufficient resources to implement this."

"The problem of wellness games is that they typically work in one direction only: they can send statistics somewhere, and the user can obtain a report of this data (e.g., of progress), but they cannot receive any additional information from this 'somewhere'. Whereas on the more serious side, information flows both ways. When a patient plays the game, the cloud is notified. From the cloud a therapist can see the results in real time, send

the patient new instructions, and so on. All of this can be operated without the patient and therapist having to be at the same place simultaneously: both can check the cloud when it suits them best. So when the scheduled face-to-face appointment arrives, time is not wasted on asking 'how are you?', because this information is already available from the cloud. This has the potential to earn considerable savings in health care. It moreover reduces unnecessary visits to the doctor saving also the patient's time." (Interviewee4.)

6.2 Summary of the results

Current revenue models and business models for health applications

When developing a wellness app, the focus has to be on entertaining the audience; the health elements come second. However, for medical apps this is not the case. Other important features of health apps include: easy to use, reasonably priced and easily locatable by customers.

One of the interviewees mentioned that choosing the right revenue model for a health app depends on whether it is designed for medical use or fitness and wellness use. 100% of respondents think that freemium as a revenue model can work in wellness apps. Furthermore, in-app purchases were supported by four out of five provided that the app is developed to support micro transactions. The opposing viewpoint was about users not understanding the value of something they cannot test prior to purchasing. Finally, advertising was accepted by all but with caution. Ads in health apps need to be related to context, unobtrusive, and users need to be able to dismiss them if they prefer.

Challenges in health application development

The majority of respondents emphasize the importance of securing and protecting health data when the apps are used. Additionally, users should be allowed to choose what data is collected and to whom it is shared. Another challenge lies in deciding the appropriate technological platform for the health app. One respondent stated that despite the positive aspects of mobility, it may not suit each customer group: then alternative platforms need to be taken into consideration.

Three out of five acknowledged proving the application's health effects as the biggest challenge. Two interviewed furthermore criticized the absence of a common forum where all of the generated health data from apps would accumulate. Finally the fact that the current health apps only generate data for their own use, and that there is no correlation or co-operation linking these apps, received criticism.

The future of health applications

One respondent suggested that "the same revenue models that are already widely used in core apps will become more popular in health apps as well". Even though none of the other interviewees announced this matter directly, their positive opinions on freemium, in-app purchases and advertising within health apps imply that they agree with the statement.

Some suggestions on future health app revenue models included: a cloud service that healthcare providers license, and a 'personal health budget' that people can use for their preferred health services. Additionally, consuming services from other countries received recognition. Future trends included: developing experience-based rather than health-based wellness apps, integration to clothes, and combining learning with physical activity and rehabilitation.

Two of the interviewees said that the individual is the payer of health apps, one way or another: through taxation; own labor; insurance payments; direct sales; and so on. Two others expressed that there is more than one payer, and that it depends on whomever benefits most from the app. It can be a private or public healthcare provider, an insurance company, the individual, or other provider that offers e.g., a cloud service where one can run their services, and market and administer them to their target groups.

7 CONCLUSIONS

The main finding of the interviews suggests that the revenue models of health apps can be based on the revenue models of core apps. In other words, the freemium model containing either in-app purchases or advertising can just as well be a viable source of revenue, for at least wellness applications. These findings are conclusive with the theoretical background.

Both theory and partially the conducted research propose licensing as an appropriate source of revenue for health apps. Kaleva et al. (2013, 6) mention that licensing health apps for private and commercial use is necessary. Likewise, one of the respondents discussed their company's revenue model as "a basic cloud service where healthcare providers license the cloud for themselves and then offer their services to their own clients" (Interviewee4).

In addition to licensing, the freemium revenue model was widely accepted by both theory and research. In particular for wellness (i.e., health and fitness) games and motivation-based apps freemium is most effective. Theory additionally declares that freemium can succeed in those wellness games "targeting a clear major segment of the mass markets". For medical games though, freemium is not an ideal approach due to the sensitivity of managing and storing health data. (Kaleva et al. 2013, 25.) Research neither confirmed nor contradicted this view. Although, one respondent believed that clients who require rehabilitation would in fact be willing to pay more than "freemium".

Moreover, four out of five respondents approved freemium with in-app purchases, provided that the app supports their use and the free version is sufficient to motivate people to opt for additional features. The opposing opinion had concerns on whether users would be able to acknowledge the added value of something they could not test beforehand.

Freemium with advertising, however, was accepted by all five respondents, although with caution. According to the research, advertising needs to be contextual in order to aggravate customers least. Users should also be allowed to dismiss ads by purchasing an ad-free version of the app. Finally the functionality and unobtrusiveness of the ads must be tested before releasing the app. Then again, theory implies that the health game should be able to reach the masses for advertising to be profitable or even sensible.

According to Papadopoulos, Sheth & Wurst (2013), health apps do not have any proven model for reimbursement. They express that one solution is to follow the model of the current core apps and expect users to pay for the apps themselves through the app stores. Another approach is to cooperate with an existing therapy and thus receive direct payment from the partner. Research advises offering health services from other countries, and providing a personal health budget that customers can consume as they see best.

Regarding the payers of health apps, two of the respondents indicated that the individual pays one way or another: through taxation, insurance payments, direct sales, or with their own labor. Moreover, two other respondents mentioned more than one payer: the user or patient, the private or public healthcare, or insurance companies. According to Interviewee3 “whomever benefits most from them pays”.

Discussion

The objectives of the thesis are viewed as achieved. The main research question of “whether the revenue models of core ‘free’ apps can work in health apps” achieved a positive response from both the theoretical review and the conducted research. In other words, freemium combined with in-app purchases and/or advertising is a viable choice for a health app revenue model.

One of the biggest challenges in making this thesis was time management. Because the work was mainly independent, apart from the interviews, it was at times challenging to stay on schedule. The issues with time management, however, declined as the work developed. Another difficulty emerged when creating the questions for the interviews. The writer had to take care that the questions were unbiased, relevant and conclusive, yet concise. This way the outcome would be up to standards of qualitative research.

Despite the positive outcome of the work, there is still room for improvement. Several additional interviews would have benefitted the work, especially with specialists with expertise on medical applications. This way the revenue models of medical apps could have been analysed to the same degree as those of wellness apps. Unfortunately, finding interviewees turned out to be more challenging as anticipated. Thus, the revenue models of medical apps are one recommendation for future research.

Validity and reliability of results

One limitation of the interviews was the unacquaintedness of the interviewees regarding medical apps and their revenue generation. A second shortcoming was that not all of the interviews were possible to be organized in a more discussion-based style. This could have generated more 'in-depth' data as evident from Interview 4. Despite these facts the accomplished results are considered to be reliable, since appropriate protocol of holding a qualitative interview was maintained throughout the interviewing process.

Personal growth

It was somewhat difficult in the beginning, but also along the thesis process, to conserve a clear focus on the range of the research work. The scope had to be narrowed down several times to make the work manageable and compliant to the main research topic. Consequently, this experience demonstrated the importance of making a clear plan on day one and keeping to it. This is a lesson the writer intends to take along to her future studies and thesis writing.

Conducting research on mobile health presented the writer with a completely new line of business and work opportunities. Partially due to the writer's internship in the Health ProPeli- project and mostly due to the thesis work, she has started to consider a future career in health and business working in health administration or similar. In particular, working to build comprehensive and holistic healthcare solutions that help reduce the costs and workload of the health sector are of great interest for the writer personally.

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